

device 10. One example of such a focussing module 28 is the Ai-AF system developed by Canon.

[0024] The device 10 according to the invention, and with it also the imaging system can include, as modular components, camera means 11, 14 and a digital image-processing chain 27 connected to it and a focussing circuit 28.

[0025] The camera means 11, 14 can include an image sensor totality 12, 13, which is as such known, together with movable lenses 15, by means of which image data ID of the imaging target IT can be formed. The imaging target IT, which is converted by the camera sensor 12 in a known manner to form electrical signals, is converted into a digital form using an AD converter 13.

[0026] The focal length of the camera means 11, 14 may be less than 35 mm declared as a focal length equivalency with 35 mm film. Some examples of the focal lengths of the camera means may be, declared as a focal length equivalency with 35 mm film, for example, 15-20 mm (special wide-angle), 20-28 mm (wide-angle) or 28-35 mm (Mild wide-angle). The use of the invention achieves a particular advantage in devices 10 with an extensive depth of field, but the invention can of course also be applied in such devices with a narrow depth of field (for example, teleobjectives).

[0027] The focussing means 28 are in the device 10 for focussing the camera means 11, 14. A solution that is, for example, as such, known, or which is still under development, can be applied as a focussing circuit 28. Using the focussing circuit 28, at least one of the image objects I1, I2 in the imaging target IT can be focussed to the camera means 11, 14, more particularly to the sensor 12, prior to the performance of the imaging that it intended to be stored, or even during imaging to be stored, if the question is of, for example, a video imaging application. This is because the imaging target IT can include at least, one primary image object I1, relative to which it is wished to focus the camera means 11, 14, and at least one secondary image object I2, which is an image subject that is of less interest from the point of view of the imaging. It can be, for example, the background to the primary image object I1.

[0028] In cameras, focussing conventionally involves the collection of statistics from the image data ID. According to one embodiment, the statistics can include, for example, a search for gradients for the detection of the edge of the primary image object I1. The statistics can be formed of, for example, luminance information of the image data ID. The focussing operations also include the movement of the lenses 15, in order to maximize the statistical image sharpness mathematically by comparing statistical information. Focussing can be performed automatically or also by the end user, who can manually adjust the focus, if there is, for example, a manually adjustable focus disc (mechanical focus control) in the camera.

[0029] If the focussing is implemented automatically in the device 10, the focussing circuit 28 shown in FIG. 1 can include an as such known autofocus control algorithm 24, in which there can be a focus-point definition portion 24 as a sub-module. As input, the algorithm portion 24 receives AutoFocus AF-data from the calculating module 23 of AF statistics. The statistics module 23 can process the image data ID coming directly from the AD converter 13, in ways that are, as such, known, and form from it, for example, the aforementioned gradient data. On the basis of the data produced by the statistics module 23, the algorithm portion 24 can decide whether it images the selected first image

object I1 sharply to the sensor 12 in the set manner. As output, the algorithm portion 24 produces control data that is as such known, for the adjustment mechanism 14 of the set of lenses 15. The control data is used to move the set of lenses 15, in such a way that the one or more image objects I1 defined as primary by the focus-point sub-module 25 is imaged precisely and sharply to the sensor 12.

[0030] The image-processing chain 27 connected to the camera means 11, 14 can include various modules in different implementation arrangements, which are used, for example, for processing, in the device 10, the image data ID formed from the imaging target IT. In both cases, whether imaging to be stored is being performed at that moment by the device 10 or not, it is possible to perform so-called viewfinder imaging, for which there can be a dedicated module VF in the device 10. The viewfinder VF can be after colour-interpolation 16, or also after the blurring filter 17 according to the invention, which will be described in greater detail a little later. In that case, the blurred background can, according to the invention, already be seen in the viewfinder image.

[0031] The image-processing chain IC can consist of one or more processing circuits/DSPs 16, 18, which are, in terms of the invention, entirely irrelevant components, and no further description of them is necessary in this connection. In this case, the colour-interpolation 16 and image-data ID compression 18 of the image-processing chain 27 are shown. When the image data ID is stored, this can take place to some storage medium 19. The technical implementation of these components, which are irrelevant in terms of the invention, will be obvious to one versed in the art and for this reason the invention is described in this connection at a very rough block-diagram level, for reasons of clarity. In terms of the practical implementation of the invention, hardware and software solutions, as well as combinations of them, can be considered. Of course, some of the operations of the modules 16, 18, 23, 24, 25 belonging to be image-processing and/or focussing chain 27, 28 can be implemented even in a single module.

[0032] As a surprisingly module, blurring means 17, 22, 26, forming a blurring module 21, are arranged in the image-processing chain 27. Of course, the sub-modules 17, 22, 26 belonging to the module 21 can also provide other tasks in the device 10 than those belonging to blurring, as will be demonstrated later (for example, focussing). The means 17, 22, 26 can be used in a surprising manner to blur at least part of the secondary image objects I2 in the image data ID, which are not the primary object of interest in the imaging target IT, which the sensor 12 detects in its entirety.

[0033] In the embodiment of FIG. 1, only the filtering module 17 of the blurring means is shown itself in the actual chain 27. The other modules that implement blurring in the embodiment in question are the filtering-coefficient calculation module 22 and the focussed-area calculation/definition module 26.

[0034] In order to blur the image objects I2 that are set to be secondary, the blurring means 17, 22, 26 use the information produced by the focussing-module totality 28. The focussing-area calculation module 26 can use the data obtained from the AF-statistics calculation portion 23 in the definition of the image area I1 and now also the data obtained from the focussing point definition portion 25. Once the portion 26 has been calculated the focussed, i.e. the primary image object in the image data ID, its location in the